CLAIMS

The invention is claimed as follows:

1. In a display system comprising a plurality of semiconductor light-emitting devices disposed on and fitted to a substrate surface, the improvement wherein:

an insulation layer is formed with said semiconductor light-emitting devices embedded therein and is thinned selectively or non-selectively to expose upper end portions of said semiconductor light-emitting devices, a conductor film is provided on upper end portions of said semiconductor light-emitting devices exposed, and upper end portion electrodes of said semiconductor light-emitting devices are led out to an upper surface of said insulation layer.

2. A display system as set forth in claim 1, wherein said insulation layer is composed of a high polymeric compound capable of forming a coating film containing one of a polyimide resin, an epoxy resin or a synthetic rubber.

3. A display system as set forth in claims 1, wherein the insulation layer is composed of a glass capable of forming a coating film.

4. A display system as set forth in claim 1, wherein said insulation layer is composed of silicon oxide or silicon nitride formed by a chemical vapor deposition method or a sputtering method.

5. A display system as set forth in claim 1, wherein said thinning of said insulation layer is carried out by a dry etching method under an oxygen plasma atmosphere, a chemical mechanical polishing method or a combination of both a dry etching method under an oxygen plasma atmosphere and a chemical mechanical polishing method.

6. A display system as set forth in claim 1, wherein each said semiconductor light-emitting device has a primary light-emitting direction in the direction from a light-emitting region toward a lower end surface on said substrate surface, and has a reflective surface for downward reflection at a portion above said light-emitting region.

7. A display system as set forth in claim 6, wherein each said semiconductor light-emitting device is formed in a pyramid shape or a truncated pyramid shape, and at least one slant surface of the surfaces thereof is said reflective surface.

8. A display system as set forth in claim 6, wherein each said semiconductor light-emitting device is composed of a hexagonal crystal of a gallium nitride semiconductor, and comprises at least an active layer parallel to (1,-1,0,1) plane.

9. A display system as set forth in claim 8, wherein each said semiconductor light-emitting device is composed of a gallium nitride semiconductor selectively crystal-grown in a hexagonal pyramid shape or a truncated hexagonal pyramid shape with (0,0,0,1) plane as said lower end surface and with (1,-1,0,1) plane and an equivalent surface as said slant surface, on a substrate surface of growth, and comprises an active layer parallel to (1,-1,0,1) plane and an equivalent surface.

10. A display system as set forth in claim 1, wherein said display system is an image display system or an illumination system comprising said semiconductor light-emitting devices which emit monochromic light or a combination of a plurality of kinds of said semiconductor light-emitting devices which emit different-colored lights.

11. A display system as set forth in claim 1, wherein each said semiconductor light-emitting device comprises a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated, said upper end portion electrode is formed at said second conduction type semiconductor layer, and said upper end portion electrode and said conductor film are formed of the same kind of metal.

12. A display system as set forth in claim 1, wherein each said semiconductor light-emitting device comprises a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated, said insulation layer is thinned, and said conductor film is formed on a surface formed by said second conduction type semiconductor layer exposed by said thinning and said

insulation layer, whereby said upper end portion electrode and said conductor film are formed as one body with each other.

13. A display system as set forth in claim 1, wherein each said semiconductor light-emitting device comprises a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated, said upper end portion electrode is formed on said second conduction type semiconductor layer with a contact metal layer of a predetermined thickness therebetween, and said upper end portion electrode and said conductor film are formed of the same kind of metal.

14. A display system as set forth in claim 1, wherein each said semiconductor light-emitting device comprises a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated, a contact metal layer of a predetermined thickness is formed on said second conduction type semiconductor layer, said insulation layer is thinned, and said conductor film is formed on a surface formed by said contact metal layer exposed by said thinning and said insulation layer, whereby said upper end portion electrode and said conductor film are formed as one body with each other.

15. A method of producing a display system by disposing and fitting a plurality of semiconductor light-emitting devices on a substrate surface, comprising the steps of:

embedding said semiconductor light-emitting devices in an insulation layer,

selectively or non-selectively thinning said insulation layer to expose upper end portions of said semiconductor light-emitting devices, and

forming a conductor film on said exposed upper end portions,

whereby upper end portion electrodes of said semiconductor light-emitting devices are led out to an upper surface of said insulation layer.

16. A method of producing a display system as set forth in claim 15, wherein said insulation layer is formed by application of a high polymeric compound capable of forming a coating film containing an epoxy resin, a polyimide resin or a synthetic rubber.

17. A method of producing a display system as set forth in claim 15, wherein said insulation layer is formed by application of a glass capable of forming a coating film.

18. A method of producing a display system as set forth in claim 15, wherein said insulation layer is formed by building up silicon oxide or silicon nitride by a chemical vapor deposition method or a sputtering method.

19. A method of producing a display system as set forth in claim 15, wherein said insulation layer is thinned by a dry etching method under an oxygen plasma atmosphere, a chemical mechanical polishing method or a combination of both methods.

20. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices each having a primary light-emitting direction in the direction from a light-emitting region toward a lower end surface on said substrate surface and comprising a reflective surface for downward reflection at a portion above said light-emitting region are used as said semiconductor light-emitting devices.

21. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices which are formed in a pyramid shape or a truncated pyramid shape and in each of which at least one slant surface of surfaces thereof is said reflective surface are used as said semiconductor light-emitting devices.

22. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices each composed of a hexagonal crystal of a gallium nitride semiconductor and having an active layer parallel to (1,-1,0,1) plane are used as said semiconductor light-emitting devices.

23. A method of producing a display system as set forth in claim 18, wherein semiconductor light-emitting devices each formed of a gallium nitride semiconductor selectively crystal-grown in a hexagonal pyramid shape or a truncated hexagonal pyramid shape with (0,0,0,1) plane as said lower end surface and with (1,-1,0,1) plane

and equivalent surfaces as said slant surfaces, on a substrate surface of growth, and comprising active layers parallel to (1,-1,0,1) plane and equivalent surfaces are used as said semiconductor light-emitting devices.

24. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices each comprising a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated, and each comprising an upper end portion electrode formed at said second conduction type semiconductor layer are used as said semiconductor light-emitting devices, and said conductor film is formed of the same kind of metal as said upper end portion electrode.

25. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices each comprising a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated are used as said semiconductor light-emitting devices, said insulation layer is thinned, and said conductor film is formed on a surface formed by said second conduction type semiconductor layer exposed by said thinning and said insulation layer, whereby said upper end portion electrode and said conductor film are formed as one body with each other.

26. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices each comprising a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor layer sequentially laminated, and each comprising an upper end portion electrode formed on said second conduction type semiconductor layer with a contact metal layer of a predetermined thickness therebetween are used as said semiconductor light-emitting devices, and said conductor film is formed of the same kind of metal as said upper end portion electrode.

27. A method of producing a display system as set forth in claim 15, wherein semiconductor light-emitting devices each comprising a first conduction type semiconductor layer, an active layer and a second conduction type semiconductor

layer sequentially laminated and each comprising a contact metal layer of a predetermined thickness are used as said semiconductor light-emitting devices, and said conductor film is formed on a surface formed by said contact metal layer exposed by thinning of said insulation layer and said insulation layer, whereby said upper end portion electrode and said conductor film are formed as one body with each other.